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UNITED STATES PATENT AND TRADEMARK OFFICE

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Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>24 November 2003</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

    a)☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

4)☐ Interview Summary (PTO-413) Paper No(s). _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: .

Response to Arguments

Applicant's arguments filed November 24, 2003 have been fully considered but they are not persuasive.

➢ Response to remarks on pages 1-5: Examiner thanks the Applicant for responding to the questions under 35 U.S.C. 112 first paragraph rejection. The 35 U.S.C. 112 first paragraph rejection is removed.

➢ Response to remarks on pages 6-8 under rejections of 35 U.S.C. 102 (e): Applicant argues that the reference French fails to teach the elements in claim 1. Examiner's replies and interpretations: The claim language in claim 1 is very broad.

> For example: the second line (a) of claim 1 is claiming: "describing a scene mathematically", French et al. in (col. 15, lines 66-67) teach that a frame rate is specified (described) which allows the calculation (mathematically) of the total number of data items (it can be an image, a scene, a view and etc.).

> Part (b) of claim 1 is claiming: "processing source and receiver information", French et al. in Figs. 3A and 3B illustrate clearly the claim language of this part of claim 1.

> Part © of claim 1 is claiming: "calculating visibility areas", French et al. in (col. 17, lines 5-6) teach the visibility of an area by rendering the parameters.

Part (d) of claim 1 is claiming: "tracing wavefronts", French et al. in (col. 7, lines 29-32) and in Fig. 5B teach the claim language (mapping, filtering and etc.).

Part (e) of claim 1 is claiming: "displaying results", French et al. in (col. 1, lines 32-40) and in Fig.1 step 29.

➤ Examiner suggestions: Applicant should clarify the preamble of the two terms "modeling visual images" and "wave propagation". Applicant should improve the clarity or precision of the language of part (a) of the claim 1. Applicant should specify with a reasonable degree of clarity and particularity between the language of " processing" in part (b) and the language "calculating" in part (c). And also requires a definition of the language in part (d) "tracing". Applicant should specify the correlation between the language in part (d) "wavefronts" and "wave propagation" in the preamble.

➤ Response to remarks on pages 8-9 under rejections of 35 U.S.C. 103(a): Applicant argues that the reference Shum does not teach or suggest the claim language in claim 1. In contrast: Shum in Fig. 19 steps 2020-2040 describes a scene mathematically, see also col. 25, line 35. Shum on col. 2, lines 50-55 teaches the claim language of processing source and receiving information. Shum on col. 9, lines 37-42 teaches the language of tracing the light rays.

➤ The prior rejection is still maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 and 14 rejected under 35 U.S.C. 102(e) as being anticipated by French et al.

1.   Claim 1.

French et al. in abstract teach the step of "A method for modeling visual images and wave

propagation", comprising the steps of: French et al. in (col. 15, lines 66-67) teach the step of

"(a) describing a scene mathematically"; French et al. in Figs. 3A and 3B illustrate the step of

"(b) processing source and receiver information"; The following steps are inherent because:

French et al. in (col. 17, lines 5-6) teach the step of "(c) calculating visibility areas"; French et

al. in (col. 7, lines 29-32) teach the step of mapping or tracing"(d) tracing wavefronts"; and

French et al. in (col. 1, lines 32-40) teach the step of "(e) displaying results".

2.   Claim 2.

French et al. in Figs. 3A and 3B illustrate the step of "The method of claim 1 wherein step (a)

further comprises: inputting boundary information for each object in a scene"; French et al. in

abstract teach the step of "transforming the boundary information to express boundaries as

boundary elements in a desired mathematical representation; determining all boundary elements

that are visible from any point on a particular boundary element, for each boundary element";

The following steps are inherent because: French et al. in (col. 8, lines 54-62) teach the step of

"identifying media on opposite sides of a particular boundary element, for each boundary element; verifying consistency of the identified media; and inputting physical parameters of the media".

3.   Claim 3.

French et al. in (col. 9, lines 24-30) teach the step of "The method of claim 2 further comprising the steps of: producing reference tables; and storing in computer memory the reference tables".

4.   Claim 4.

The method of claim 1 wherein step (b) further comprises: inputting a source position for all sources; inputting a receiver position for all receivers; determining all boundary elements that are visible from a particular source, for each source; determining all boundary elements that are visible from a particular receiver, for each receiver; storing in computer memory the determined boundary elements that are visible from a particular source, for each source; and storing in computer memory the determined boundary elements that are visible from a particular receiver, for each receiver. See claims 1 and 2 rejection.

5.   Claim 5.

The following step is inherent because: French et al. in (col. 8, lines 54-62) teach the step of "The method of claim 4 further comprises the step of verifying media consistency of the identified boundary elements".

6.   Claim 6.

The following steps are inherent see claims 1-5's rejection "The method of claim 1 wherein step (c) further comprises: determining visibility limits of all boundary elements that are visible from any point on a particular boundary element, for each boundary element; determining visibility

limits of all boundary elements that are visible from a particular source, for each source;

determining visibility limits of all boundary elements that are visible from a particular receiver,

for each receiver; eliminating from further processing those portions of all boundary elements

whose visibility is screened by other boundary elements, relative to any point on a particular

boundary element, for each boundary element; eliminating from further processing those

portions of all boundary elements whose visibility is screened by other boundary elements,

relative to a particular source, for each source; eliminating from further processing those

portions of all boundary elements whose visibility is screened by other boundary elements,

relative to a particular receiver, for each receiver; determining visibility borders; subdividing

each visibility range into visibility subranges such that the visibility borders of each visibility

subrange can be represented by a continuous", The following steps are inherent because: French

et al. in (col. 15, lines 55-58) teach the step of "monotonic function with only one type of

curvature; and storing in computer memory the visibility subranges".

7.   Claim 7.

See claim 6's rejection. The method of claim 6 further comprising the step of identifying unique

visibility borders among all remaining portions of all boundary elements.

8.   Claim 14.

French et al. in abstract teach the step of "A method for modeling visual images and wave

propagation, comprising the steps of: French et al. in (col. 15, lines 66-67) teach the step of " (a)

describing a scene mathematically; French et al. in Figs. 3A and 3B illustrate the step of " (b)

processing source and receiver information; The following steps are inherent because: French et

al. in (col. 17, lines 5-6) teach the step of "(c) calculating visibility areas; (d) interpolating front

elements analytically; French et al. in (col. 7, lines 29-32) teach the step of mapping or

tracing"(e) tracing wavefronts; and French et al. in (col. 1, lines 32-40) teach the step of "(f)

displaying results.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   Claims 8-13 and 15-18 rejected under 35 U.S.C. 103(a) as being unpatentable over

French et al., and further in view of Shum et al.

10.   Claim 8.

French et al. do not teach the step of "The method of claim 6 further comprising the step of

compressing the visibility limit data stored in computer memory to save memory space",

however Shum et al. in (col. 1, lines 7-12) teach the step of compressing data.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to incorporate the teaching of Shum et al. into French et al. in order to have techniques for

displacement estimation and multi-resolution on the ray path of light. And also by storing data

that is regularly accessed apart from data that is selectively and variably accessed, overall access

speed and efficiency are improved.

11.   Claim 9.

The step is obvious because French et al. in (col. 1, lines 15-19) teach "the step of building

cross-reference tables".

12.   Claim 10.

French et al. in Figs. 3A and 3B illustrate the step of "The method of claim 1 wherein step (d)

further comprises for each source: (i) determining if there are any direct paths between a

particular source and the receivers"; the following steps are inherent because: French et al. in

(col. 17, lines 5-6) teach the step of "(ii) subdividing an initial wavefront emanating from the

particular source into front elements such that a particular front element impinges on a

particular boundary element that is visible from the particular source"; French et al. in abstract

teach the step of "(iii) determining a projection of the particular front element onto the

particular boundary element, for each front element"; French et al. in (col. 7, lines 29-32) teach

the step of "(iv) determining reflected front elements, for each front element; (v) determining

refracted front elements, for each front element"; the step of "(vi) determining whether any of

the reflected or refracted front elements impinge on any of the receivers"; is obvious because

the signals require to go through the filters, otherwise the signals impinge on any of the

receivers. The steps of (vii) determining a particular ray path between a particular receiver and

the particular source, for each front element that impinges on any of the receivers; and (viii)

computing physical parameters based on the particular ray path, for each particular ray path";

are obvious because ray path between a particular receiver and the particular source is

depending on the environment, frequency, amplitude, and etc. The step of "(ix) storing in

computer memory the computed physical parameters"; is obvious because French et al. teach in

Fig. 1 a database. The step of "(x) determining all boundary elements on which the reflected

and refracted front elements emanating from the particular boundary element will impinge, for

each front element"; is obvious because French et al. illustrate in Fig. 4 filter path. French et al.

do not explicitly specify the step of "(xi) subdividing the reflected and refracted front elements that impinge on more than one boundary element into subdivided front elements such that each subdivided front element impinges on a single boundary element"; however Shum et al. illustrate subdividing the signals (reflected and refracted). The step of "(xii) repeating steps (iii)-(xii) using a particular subdivided front element and its associated boundary element instead of the particular front element and the particular boundary element, for each subdivided front element, until all subdivided front elements are either eliminated or no longer impinge on any boundary", is filtering that French et al. teach in Fig. 4 the filter path.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Shum et al. into French et al. in order to have techniques for displacement estimation and multi-resolution on the ray path of light. And also by storing data that is regularly accessed apart from data that is selectively and variably accessed, overall access speed and efficiency are improved.

13.   Claim 11.

The steps of "The method of claim 10 further comprising the steps of: determining whether the reflected front elements or the refracted front elements have less energy than a comparison value, for each reflected front element and each refracted front element; and eliminating from further processing each reflected front element and each refracted front element having less energy than the comparison value" are obvious because a filter or an equation can be set or modify to provide the claim invention.

14.   Claim 12.

The step of "The method of claim 10 further comprising the step of eliminating from further processing each reflected front element that has undergone a user-defined number of reflections", is obvious because a filter or an equation or threshold can be set or modify to provide the claim invention.

15.   Claim 13.

The step of "The method of claim 10 further comprising the steps of: determining a particular reverse ray path from the particular receiver to the particular source to verify that the particular reverse ray path terminates within a tolerance value at the particular source, for each of the particular ray paths; and computing a modified particular reverse ray path for each particular reverse ray path that does not fall within the tolerance value at the particular source until the modified particular reverse ray path terminates within the tolerance value at the particular source", is obvious because a filter or an equation or threshold can be set or modify to provide the claim invention.

16.   Claim 15.

French et al. in (col. 17, lines 1-11) teach the step of "The method of claim 14 further comprising the step of determining intensity of a reflection".

17.   Claim 16.

French et al. illustrate in Fig. 4 the step of "The method of claim 15 further comprises the step of determining shading".

18.   Claim 17.

French et al. illustrate in Fig. 4 the step of "The method of claim 15 further comprises the step of determining shadowing".

19.   Claim 18.

French et al. in (col. 17, lines 1-11) teach the step of "The method of claim 15 further

comprising the step of determining color".

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Javid A Amini whose telephone number is 703-605-4248. The
examiner can normally be reached on 8-4pm.
If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Michael Razavi can be reached on 703-305-4713. The fax phone number for the
organization where this application or proceeding is assigned is 703-746-8705.
Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the receptionist whose telephone number is 703-306-0377.

Javid A Amini
Examiner
Art Unit 2672

Javid Amini

JEFFERY BRIER
PRIMARY EXAMINER